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PANTAにおけるエンドプレートバイアス時のイオン流れ場の観測
Observation of ion flow during End-Plate Biasing Experiment in PANTA

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In fusion plasmas, turbulence-driven flows such as zonal shear flows and intrinsic rotation in toroidal direction play an important role for improvement of plasma confinement. To understand the flow formation mechanisms, evaluation of flow driving force, i.e. momentum flux and its balance in the steady state are important. Direct measurement of momentum flux was done in linear plasma device, PANTA, in which drift-wave turbulence is excited and saturated in helicon plasma [1]. Parallel flow is generated in PANTA and couplings between parallel flow and turbulence has been suggested [2].

Here we discuss the relation between flow and turbulence. We changed the parallel flow structure by using the end-plate biasing and responses of the drift waves were observed [3]. The diameter of the biased end-plate was 50 mm, approximately half of the plasma diameter. The current flows from end-plate to vacuum vessel through plasma. Parallel Mach number was measured with a Mach probe (two-side Langmuire probe) at four different axial locations. During biasing, a change in the parallel flow toward the end-plate was observed in the central region (inside the end plate radius), and a strong parallel shear flow was generated at just outside of the end plate radius. The change in the parallel flow was remarkable near the end-plate, and the flow velocity in the central region was reduced as the distance from the end-plate increases. The normalized fluctuation amplitude in the shear layer was leveled off or even decreased during biasing. We will also report changes in azimuthal flows and Reynolds stress with their axial dependences during biasing.

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